Tear film stability and immunoglobulin A variation during the day

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Currently, there are more than 100 million contact lenses (CL) wearers worldwide and, according to the International Association of Contact Lens Educators (IACLE), this number is expected to increase to about 150 million. This rise has led to a continual introduction of new materials, aiming to bring greater comfort, better ocular health and improve visual quality to their users. In spite of this advances several studies reveal changes in ocular physiology and ocular discomfort related with CL wear. It is important to evaluate whether these physiological changes and ocular discomfort are actually resulting from CL wear, or if there are pre-existing variables in the ocular physiological cycle that can also occur in non-contact lenses wearers.

Tear proteins are essential to maintain comfort and protect the eye against bacteria. More than 400 proteins have been identified in human tears, from which, four are found in significant concentrations, lysozyme; lipocalin; lactoferrin; and secretory IgA. The objective of this study was to correlate tear film stability and protein content in non CL wearers in two different times of the day in order to access the natural ocular changes.

Twenty healthy and young individuals, with an average age of 24±2.5 years without dry eye symptoms, were included in the study. For each individual, in the morning and afternoon of the same day, Non Invasive Break Up Time (NIBUT) measurements were performed with a Tearscope Plus equipment, This procedure was performed in in both eyes in a controlled laboratory setting,. Additionally,, tear samples were collected with microcapillarity tubes and stored at -80ºC.

Protein profile was analyzed in desnaturing conditions, by Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and in native PAGE electrophoresis. IgA were quantified by Enzyme Linked Immuno sorbent assay (ELISA).

No significant differences in the tear film stability and protein profile were observed between the left and right eye, contrary to the obtained values between morning and afternoon. For NIBUT, the mean values obtained were 17±22.3 s and 12.79±4.25 s, in the morning and in the afternoon respectively and this difference is statistically significant (p=0.000).A difference was also observed in the pattern of tear IgA variation with a higher concentration in the morning (2.656±0.625 mg/ml) than in the afternoon (2.116 ±0.789 mg/ml), being this difference statistically significant ($p<0.05$).

In this study, the tear film stability and IgA decreases on afternoon, usually the period of the day on which the CL wearers show eye discomfort. These results indicate that there are daily variations in composition and properties of the tear film even in non-CL wearers, suggesting that changes in composition of tear film may not necessarily be caused by the CL wear or by the presence of ocular or systemic pathologies.